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On the status of the leopard in Turkey, again

This review aims to present data on the existence of the last leopards *Panthera pardus* in Turkey. They exist in a small border region in the south-east of the country. It is possible that some individuals penetrate or survived also in the north-easternmost mountainous region of Anatolia. The species probably went extinct recently in the Taurus Mts in the south-west Turkey. The analysis shows that the data mentioned for the eastern Karadeniz Mts are not reliable. The leopard in Turkey might have disappeared before it was possible to investigate and clarify its taxonomy and ecology. Awareness activities of local volunteers should urgently receive the support of conservation organisations for saving the last leopards in Turkey.

The data on the presence of the leopard in Turkey - the westernmost periphery of its Asian distribution area - is of special interest, due to the critical population status of this impressive felid. It is possible that the leopard is represented in the country by a few individuals only (Khorozyan 2008). Its habitat and ecology remains practically unknown. The leopard in Turkey is named generally Anatolian leopard and was regularly referred to the subspecies *P. pardus tulliana*, but in fact its

taxonomic status stays obscure. It is possible that the boundary of two subspecies is in Central Anatolia: The Anatolian leopard *P. p. tulliana* and the Persian (Caucasian) leopard *P. p. ciscaucasica* (= *P. p. saxicolor*, Khorozyan et al. 2006). Unfortunately, the leopard in Turkey could disappear before its taxonomy and ecology has been investigated and clarified. The presence of leopards in Turkey has been the topic of different studies in the recent decades. Special attention to this question

has been given by Kumerloeve (1957, 1967) in the 1950s and 1960s. However, investigations continue also today (e.g. Gürpınar 2000, Baskaya & Bilgili 2004, Can 2004, Khorozyan 2008). In the monograph "Mammals of Turkey and Cyprus", Kryštufek & Vohralík (2001) noted that the total area of the leopard in Turkey covers the Aegean Taurus Mts, south-east Anatolia and eastern Anatolia. Today's data show, however, that in these regions the felid is present in only very small numbers in isolated small areas, and perhaps even in only one small area of its former range in Turkey (see below). Against the background of very scarce data about its existence and pessimistic forecast about its future, some recent studies report evidence of its presence from the field (Baskaya & Bilgili 2004) in the eastern Karadeniz Mountains (eastern Pontic Mts), where previously no evidence of its existence had been found (Can 2004). On the website of the Forestry Faculty of the Karadeniz Technical University, Trabzon (2015), especially in the profile of Prof. S. Baskaya (http://www.ktu.edu.tr/dosyalar/yaban_563fc.pdf), some results of a recent study on leopard in the Karadeniz Mountains are presented. According

to the authors of the website (S. Baskaya pers. comm.), the pictures from camera traps and pugmarks are evidence of a viable population of the leopard in many areas of the Pontic Mts.

Material and methods

A Bulgarian zoological expedition with participation of scientists from the National Museum of Natural History, Sofia (authors of this article), took place in the eastern Karadeniz Mts in August 2015. Surveys were made in some of the areas mentioned by Baskaya & Bilgili (2004), for which they published field data documenting the presence of the species. Between 18 and 26 August 2015, we have visited the region of Ovit pass, from Rize to Ispir and Erzurum (close to the points 23 and 24 in Fig. 1 in Baskaya & Bilgili 2004) and the Limonsuyu area (points 13-15 and 17), as well as the mountains more to the west, in the region of Kumbet, south of Geresun, where the tracks found by Baskaya & Bilgili (2004) were identified as leopard pugmarks. Day or night transects and questionnaires were conducted by walk and by car for identifying the presence of several big carnivores including the leopard (Supporting Online Material SOM Table T1).

Field information (camera-trap photos, scats) collected by the team of Prof. Baskaya was analysed. Additional information was collected through interviews with Prof. M. Eroğlu and Prof. S. Baskaya, Karadeniz University, Mehmet Ertuzun, Ankara, and employees from the Forestry Department, Rize.

Results

The Eastern Karadeniz Mts (A in Fig. 1).

According to the interviews conducted with displaying pictures of carnivores, the leopard was completely unknown to local people in the area.

The analyses of the photos from the website (http://www.ktu.edu.tr/dosyalar/yaban_563fc.pdf); see Figs. 2 & 3) show the following: The first two photographed animals are not felids and the body size measurements presented are obviously wrong. The other photos, despite the calculated wrong dimensions, represent the genus *Felis*; some of them are probably feral domestic cats and certainly do not represent leopards. Evidence for this are the long and pointed ears, gracile neck, too underdeveloped front part of the body in relation to the hindquarters, slim muzzle and the tail position while moving (Fig. 2).

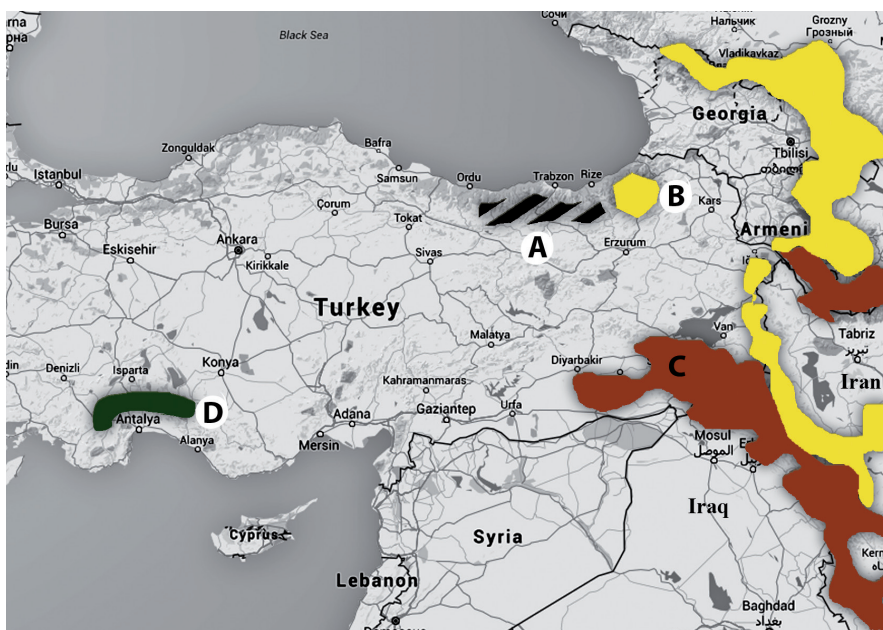


Fig. 1. Recent distribution of the leopard in Turkey. The map is based on a map published by National Geographic (<http://news.nationalgeographic.com/news/2014/12/141219-persian-leopard-iran-iraq-land-mine/> downloaded 22.9.2015). Persian leopard distribution: A (black shaded area): Karadeniz Mts where the leopard is not present based on our conclusion. B (yellow) = possible presence. The region mentioned in our text as north-eastern mountainous frontier region is approximately where the yellow spot is. C (brick red) = confirmed presence. D (dark green): Region where *P. p. tuliana* existed till the beginning of the century, but now is considered extinct.

A photo from 9.7.2013 (Fig. 2) shows the stripes at the base of the thigh and the dark colour of the foot, typical for *Felis catus* (Spassov et al. 1997). The scats presented in the website are probably from a canid. Also the photographed pugmarks must be from a canid. The outline of the rear edge of the base pad, on the larger and more clear photo (Fig. 3A), is unlike the one of a felid. Due to the angle from which the photo was taken it is not clear whether the track is from a front or a hind paw. The size of 11 cm x 10 cm (according to the photo) corresponds to the paw size of a great shepherd dog, such as Turkish Kangal (Fig. 3B). Our field experience shows that the paws of sheep guarding dogs are often very broad with a strong finger spread (see Fig. 3C), and some dog paw proportions are very similar to those of leopards and lynx, however finger prints are larger than in felids as shown in the photo. Nails are not always visible in dog footprints as we have observed in several cases with Kangal Dogs, running on open land in the mountains (Fig. 3C).

The north-eastern mountainous frontier region of Anatolia (B in Fig. 1)

During the expedition, some interesting, although uncertain information on the possi-

ble presence of a leopard in the mountains of north-east Anatolia, close to the border with Georgia, was collected (Prof. M. Eroğlu, Karadeniz University, pers. comm.). Sani Gümüş and his friend Hüseyin, while hunting the chamois *Rupicapra rupicapra* in the area between Yusufeli and Artvin in 1992, had seen a large felid, never seen before by them. Before their observation, an old hunter had told them about the presence of a dangerous large carnivore in the area. The two hunters identified the animal as a leopard based on a picture in a field guide. The lynx was well known to them. A Turkish photographer, working for the Discovery channel, saw a very large carnivore climbing up on an old spruce tree and shaking strongly the branches in the area between Artvin and Hopa in 2007. The photographer believed it was a leopard. According to Marmara Forest Service data, a leopard was photographed also to the west of this region, near the Kachkar National Park, north-eastern Turkey, in 2002 (Birch 2006).

The south-eastern frontier region of Anatolia (C in Fig. 1)

The leopard is still found along the south-eastern border of the country as confirmed by three recent records:



Fig. 2. Illustrations from the website of the Forestry Faculty of the Karadeniz Technical University, Trabzon, 2015 (http://www.ktu.edu.tr/dosyalar/yaban_563fc.pdf), which are presented there as proofs for the presence of the leopard in Karadeniz Mts.

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In 2003, evidence for the presence of the species in the Lake Van area in south-eastern Turkey (Birch 2006) was found in form of a skin (E. Can, pers. comm.).

A leopard was found dead (killed?) in the Gabar Mountains near Bitlis, Şırnak Province, in 2010 (M. Ertuzun, pers. comm., Avgan 2013a, see also <http://ria.ru/world/20150312/1052189278.html>, downloaded on 18.9.2015).

The last trustful information for leopard presence is very recent (M. Ertuzun, pers. comm.; see also: <http://www.hurriyetdailynews.com/shepherd-kills-first-anatolian-leopard-sighted-in-turkey-for-years.aspx?PageID=238&NID=57317&NewsCatID=378>). A leopard was killed near Solmaz Village, Diyarbakir Province, south-east Turkey, at the beginning of November 2013 (Fig. 4 A-B; see also Avgan 2013b). The area where the leopard was killed is rather open according to photos kindly provided by M. Ertuzun, and could hardly be permanent habitat for the species.

The locations of all three records are in proximity to each other and represent an update on the presence of the species in this region and its presence in Turkey in general. The

species is extinct in Syria (Khozoryan 2008), and the presence of a leopard close to Lake Van, and near Bitlis and Solmaz could be explained by a micro-population found in the south-east of the country, most likely associated with the north-western Iranian population of the subspecies *P. p. ciscaucasica* (Caucasian or Persian leopard), which inhabits the border areas between Iraq, Iran and Turkey (Avgan et al. 2016; Fig. 1). The killed leopards have a relatively deep and rich tawny coat coloration of the back (Fig. 4). It is generally believed that this is characteristic for *P. p. tulliana*, although it is not proven that this form is a bona fide subspecies. But it seems that such individuals are found rarely among Persian leopards (Khozoryan et al. 2006). The spots are relatively large and sparsely distributed, which is characteristic for the region. According to the autopsy results, the animal was a young male of 90 kg, which is curious, because the weight is close to known records for adult animals (Milliyet.com.tr. Gündem, 04.11.2013, 17:23 h <http://www.milliyet.com.tr/olu-leoparla-poz-vermeyem-kalmadi/gundem/detay/1787065/default.htm>).

The West-Anatolian Leopard. The South-Western region, Taurus Mts. (D in Fig. 1)

The continued existence of the Anatolian leopard in south-western Turkey is uncertain (Khozoryan 2008), but signs of its presence there was found in the 1990s (Ullrich & Riffel 1993), and near Antalia, Taurus Mts, in 2001 (Can 2004). Unfortunately, more recent investigations (Giannatos et al. 2006, Albayrak et al. 2012) did not confirm the presence of the species and lead to the conclusion that the leopard is extinct in the area.

Conclusions: The recent state of the leopard in Turkey

Based on the information collected here and analysed, the status of the leopard in Turkey can be summarised as following:

We cannot support the reported widespread presence of leopards in the eastern Karadeniz Mts with our analyses of the presented evidence on the website of the Forestry Faculty of the Karadeniz Technical University. We agree with Can (2004) that the presented evidence is at least questionable.

It cannot be excluded that the Persian (Caucasian) leopard exists, or enters sporadically, in areas close to the eastern or north-eastern Turkish border. This could be explained with the presence of leopards in neighbouring countries, although there is only scarce data (Khozoryan et al. 2006, Khozoryan 2008, Askerov et al. 2015; see also news from south Armenia at news.am/rus/news/163867.html, downloaded 18.9.2015).

Based on recent investigations, the Anatolian leopard is extinct in south-western Turkey (Giannatos et al. 2006, Albayrak et al. 2012). A last leopard refuge, related probably to transboundary migrants, exists in a small area bordering Iran and Iraq in south-eastern Turkey. The most recent data collected on the existence of leopards in Turkey reveals a disturbing picture of the status of the species in the country, also stated by Khozoryan (2008). It might be represented perhaps by two subspecies. Hunting of leopard is forbidden in Turkey, but there is excessive and illegal hunting of large carnivores and their prey (Can 2006). Our observations confirm the presence of active hunting and poaching in mountainous areas, despite strict prohibition. Unfortunately, the only presence of leopards in Turkey is in an unstable region. There is a chance for the conservation of the last leopards in the country together with awareness activities of local volunteers, but they urgently need support from conservation organisations.

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Fig. 3. A: Photo of a pugmark that has been identified as leopard, presented on the website of the Forestry Faculty of the Karadeniz Technical University, Trabzon, 2015; B: head of Anatolian Shepherd Dog (Kangal) head; C: a paw of a Kangal.

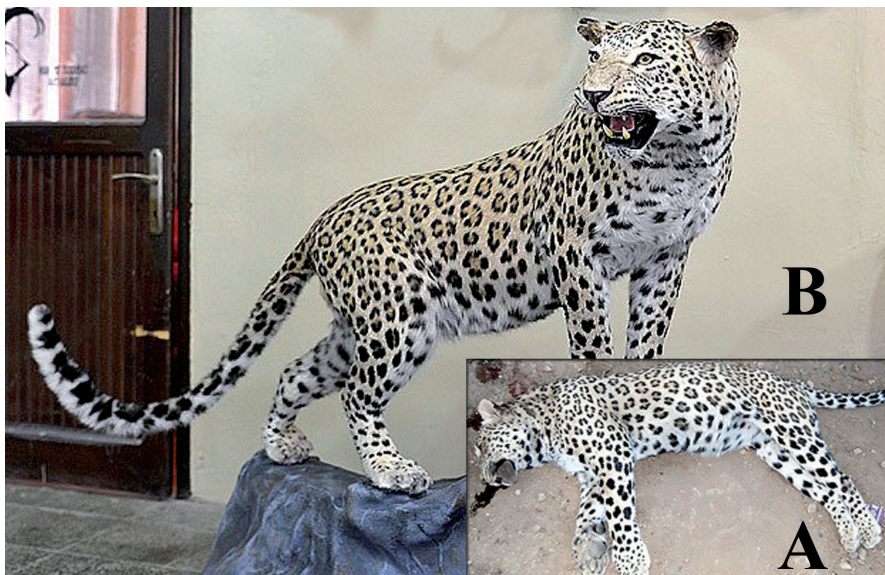


Fig. 4. A: The last leopard killed in Turkey near Solmaz village, Diyarbakir province, in November 2013; B: The same animal mounted in a hotel (photos of M. Ertuzun and Dr. Y. Ergir).

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Supporting Online Material SOM Table T1 is available at www.catsg.org

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SOM T1. Transects and questionnaires carried out in the eastern Karadeniz Mts in 2015.

Transects	Localization	Questionnaires	Date
-	-	Q001	17.08.2015
T01	Koprubasi - Limonsuyu	Q002	18.08.2015
T02	Limonsuyu - Uzuntarla - Caykara	Q003, Q004	19.08.2015
T03	Limonsuyu - Beskoy	-	19.08.2015
T04	Ikizdere - Ispir Valley - Ozluce	Q005	20.08.2015
T05	Ikizdere-Duskoy	Q006	21.08.2015
T06	Derekoy - Ozluce-Ispir	Q007	22.08.2015
T07	Kalkandere	Q008, Q009, Q010, Q011	23.08.2015
T08	Camlihemsin - Kachkar National Park	-	24.08.2015
T09	Dereli - Kumbet	Q012	26.08.2015